CIVIL ENG NEERING

ONE MARKS QUESTIONS

1. The symmetry of stress tensor at a point in −itt body under equilibrium is obtained from
   a. conservation of mass
   b. force equllibrium equatlons
   c. mcmeru eqeilibnum equations
   d. conservation of energy

The components 61'strain teusor at n point in the plane strain ease Call be cbtained by measuring longitudinal main in following directions
   a along any two arbitrary direcnons
   b. alcog any three arbitrary directions
   e. along two mutuwJ), onhogonal directions
   d. along any arbitrary duecuon

3. For a linear elasric frame. if stiffness matrix Is doubled with respect to the existing stlJIness mattix, lbe deflection of the resulung frame Will be
   a, twice the existing value
   b. half the existing value
   c. the same as exisung, value
   it Indeterminate value

4. Considering bC4f\1 as axially rigid, fhe degr ee of Ireedcm of n plane fraille s-(JWT below is

   a. I)
   b II
   c. 7
   it 6

5. 15,J343-1980 hmus the minlmum chnracieristic strength of prestressed concrete for post rensioned work and pretension work :is
   a 25MPa; 30l\1Pa respectively
   b. :!5MP4, 35MPa respectively
   c. 30MPa, 35MPa respectively
   d. 30M Pa, 4t1l'vn'arespecl1vely

6 The p!J1iCl factor of safel) (or concrete as per lS:456-2000 i$
   a 1.50
   b_ LIS
   c. U.87
   d. 11.44(,'

7. The pernussible stress in axial tension <z.t In steel. member on Ihe net affective area of the -sechon shall no! exceed If. is the yield stress)
   a. 0,80 f)
   b (1,75 f,
   c. 11:6u l',
   d. u,50 f,

Rool time method Is used 10 determine
   ll. T. lime factor
   b. c., coefficrem ol' consolidatlon
   c. Ill. coefTicienJ of comp~sibil il),
   d, rn.. coefficient of volume compressibility

!l Negative s-lo fridion in 3 SOil is considered when the pile is constructed through a
   a, fill material
   b dense coarse sand
   c. over consolidated sll.l]'clay
   d. dense fine-sand

I (l. There are IWO looriogs Testing on the ground surlce, One rooting i~square 01' dimension '8' The other is strip rooting of Width '.8'. Both of them are subjected to n loading intensity ot' q. -rile pressure intensity al an)' depth belo« the base of Ole looting along thecentre line would be
   a. equal in both foollligS
   b. large for square fooling nod small (or slrip tooting
   c. large for strip l'ooting and small for square footing
   d. more' for strip footing I1tshallow depth (SB 1 (Ind more for square fOOtlOg al large depth (>B)

11_ A cl~ytl)'~S'il has a maximum dry t.lansilY of 1*(j'kNfm'* and epti mum moisture content of 12~. A contractor during the

cqtisu:ucqtrit of core or .an ctiril dam obtained, the dey de"sey 152kNJJI1' ®d. water coTit'enl il0/0. This roli§1:t11CI,on is ;cc"!'bl1,1e because

a. fite d'en.ity is Jess rrutr the maximum dry density andwater.contenl.is rul t;lry ~de."Foptimum
b. the compacuon <i(.\lsity is very low and watercontent is.less than 12%
c. the oompaetion is done. on the dry side of the optimum
it., both (he dry density-and ""ilt~r content of !he Conlpacted s,oil are wiihin the desirable limits

12 AI) {Pert tracer " lOjecll'd contmuously from a pointin an. unsteady flow field. TIt" locus oflocattons ef all.fhe tracer particles. at an Instance of lime represents

a. Streamline
b, J11thllhe
c, Streamtnbe
d, Streakline

J 3 The riadul!J. of differentlal.manometor of a Venturimeter, placed at 'W' to ill" horizontal .is-llcm, If t.h~Venflirimeteris lurned to horizontal p(lsiu~ Hie .manometer reading will be

R. Zero
h. *Cill
c. 11 em
J. 11.,fi em

III. A horizontal bed channel is followed by a steep bed channel as shown in. the figure. TIle !l'8dually·yaried profilllS over the horizomal ani! steep beds are

a, R~,and Snxcsj)<1¢tively
b. R2!mel S!,respectiveiy
c- HJ and S. respectively
J. H-ann 5i respectlve.lY

15. Total KjeldahJ ll.ilr()geJlis n measure (If

a, total organic nitrogen
b. total organic and ammonia nitrogen
d. toll!]ammenianitregen
d. tobil inorganic and ammoniauitrogen

H),) Teu is equivalent to the OXlIO\lr produced by

a. 1n\glio[-cllLoroplatinata ion
b. 1 ms/lof platinum iOIL
c. l.mgll platinum in. fonn of chloroplatinate ion
d. 1 mg/l pfou;ancr,o)llot<1f\lntjn;1t1ljon

11 W aerobic ert";rl'l1lllenlj, nitrosumonas. QQIIV~

a. NH.3 to 'N~
b. NO-- to 1'1'03-
C. Jim .. l'0 N~O
d. Nth' 10 HNOa

1fl. Bulking sludge refers 10 having

o. F/M"' 0.3Jd
b. 0.31dc::.FfM.: 0.6/d
c. FfM~zero
d. P.fM.> (l.tifd

19. WIletl the cutflow frQln a storage reservoir is uncontrolled ill! ill n free\y operating spillway, 1M of outflow Irydiog|'aph occurs at

a, the·pOinl of intersection of'1he inflow and outflow .hydrographs
b. n POUt!; atrec the intersection of the inflow and outflow .hydrographs
c, the, tail of'inflew hydrographs
d, a P!lmt, before the intersection of Ille inflow and outflow JlYdfO"grnplts

20. The intetl$'ty of rainfall and time Interval ofa,l:ypi."n1 storm are:

TIlli,: hllel'Val (mlhutes)	Intensi.lY of r.Jinrall (U1mlm.inule)
0·19	0,7
10,20	t.t
20·30	2~
30.·40	15
~0·50	1.2
:50-60	1.3
6()..7()	(l.!)
70·S.D	0.4

TIle maximum intensity of rainfall for 20 minutes deration of ihe storm.is

a, .Unnn/minute
II. l.f;5 mml1J1Ulll[;J
c.].~ ulltlfllijhul"
d. 3.,7 JTun/nlillute

11 On which of file canal systems. R.O KCIlJle3y, cxecutivc-cagiricer in.the Pulljab Irrigation Department .made Jfis,

ob~ervul1ons lor proposing l,i8 theory 00 stable channel~'1

:1. Krishna \Ve~t"" Della t.'nnls-

b. LAwcrBad [Juab ",ma,'

c. Lower Chenab canals

U. Upper B3.ri D<I~bcanals

22. Whicb o r1) of the ruuowu'J! <:I:luoliQ"" repn:senl. Lb~downstream proru" 1)(Ogee spillway wilb vertical upstream thee') (~) are me coordinates 0f the poinl I)n the downsfrearu profile ,.lJb origin . I the crest. of the spillWAY and "Lt ",the: design head.

a. L= 6'S(...!)'110 H,‾ Hi

b. .1..._ 0.S(2:_ J'~' R, If

t:. _'-: 20(H, r~'

d. J' 2.0 ! f(H;

23. The l-gll1-**of summit** CIUVE- **on** **i1IIIvo** lane two w.3Y highway depends upon

.... allowable: rate of change of oentrifugal .00el<':1'.1100

Il. ooaffiolcOl of IJot"".I-fr!ction

c. ruq,iIl'ed stopping sigl\L dlsbneb

d. ,,,quir.iI overtaking ~igll1 distance

2-1-. Pruclhnll Mllllrj Gram Sadek Ynj,," (PMGSY), launched in the yeor 200d, 3im~to pff)vidd rural connec'ivily with aU-wcaUler reads. It 15 PI"po~ed to cennecs II", hab't31.l0nH in plain aceas of pepuletion more-than 500 persons by the YOM

a. 21)(15

h. 2()()7

c. 20 Itl

d. 2()I2

25. Llst-l conl.lo. some prn"cr1i~,of bitumen. List-Il. .giws u list of Laboratory Tests conducted on bitumen to determine the properliQli. M.I~h Ihe property with the corresponding [!;oil and ~le<:I the COL answer using, the codes giv~D below the lis",

Li"l-J

P Resislance to I)<)w

Q. Ability 10derinin under lo•d

R. ...ty

L.I$t-ii

1. Ductility test

2, Penclralion te'J1

3. FI.5h nnd fin: poin. test

Code~ :

	p	Q	t~
a,	2	I	3
b.	2	3	I
c.	I	2	:I
~.	3		2

26, Bjlllbtin"4Jj concrete IS a nih comprising of

a. fill" .g!.(regplc. filler and bitumen

b. fill" agg"gnte and bitumen

c. coarse aggregate, fine 3gg"'8Dic. filler arid bitumen

d. ooarse'gg,-egate.IiUer."nd biulllC1l

Pa.31''Ole fil'llor 0f fP(XTY')-' rTfr wil! b.

27. ('lln~ider the m"II"i<"~ X".I. Y,.I II .nd

a, (2 2)

II. (3 3)'

e, (4- 3)

d. (3 4)

28. ('onsider a nun-hoonogene()ll$ system of linear equ31.ioru; ""l't'L""cutlnjJ uu,\b~'1D.tic.Uy au over-determined system, $u<:l1" sys\"" will be

3. c(1n~isl"n1hn\~ng~ unique solution

b. consistent ha\ilng many sotutions

c. ;no)(,,\$il;t..,1h.vin8 ., uniqueSOlllliQn

d. in~(m~illtCnIhuvlol! 11;'.(llu,lon

29. Whioh nne of Ihe following is NOT true rur complex.uumber Zj aud Z.,?

a. Z,=<I,Z, ZJ |Z,I'

b. 17.,- .t,I'S'IZd+IZ,1

c. IZ,- £;1" IZ,I-Iz, I

d. IZ.. Z,I' 4-Iz, -Z,I' =21z,11 +2Iz.I'

30, Which 01\" 0I' tl\(. f',llowing ~1.f<m1ents L~ Nt JI' t~ue'1

a, 'file measure .,l' slkewpess i~dlIJlei1dlml upon UlUallloult of dJ~I)CC'lij~"

b. In. symmeuie dislributiou, the values **of** mean, **mode and median afO the** same

c, I" • posilively skewed distribution, eltan ~ median ~ "atla

d. ill IT negatively skewed distribution. mode > mean> median

TWO MARKS QUESTIONS

31 If principal stresses in a two-dimensional case are -10 MFa and 20 Mr.a respectively, then maxirnum shear sp'CSS81 the point I5

a IOMPn

b, 15MP~

c. 20 MFa.

d. 30 MPa

32 flte bending moment diagram for a beam is given below"

...... - ..

TIle shear force. at seetlons aa, and bb' respectively lire of tl,ltl magnitude

a, 100 kN. 150 kN

b. zero, 100 10'11

c. 'Zero. .50'kN

d. I0<J!<N.I 00 kN

33.. A circular shaft Shown in the figure is subjected to torsion Tal two points A and B. The torsional rigidity of portions CA and SD is GJ, aud that of ponion AS is G}j. The r()18tionS'of shaft Pl poirus). and 'B are a, and a,. The rotationa, is

J.. Cf a t

CAB ' D

L f L L I,

TI.

0.1, +G/,

b. 7T.

GJ,

7T.

OJ,

TI.

d GJ GJ

Q. Moment distribution method

R.. MOII00 of three momerus

S, Ca.-ligli-no'sseC()nd theorem

List-II

1 Force method

2. Displacement method

Codes'

	P	Q	li.	S
a.	1			2
b	I		2	2.
~	2	2		1
d,	2		2	1

35. All member (If !l1e frame shown below have the same flexural rigidity E'I and length L. If u moment Ivi is applied ni joint B. the rotation of the joint is

a. I:!!:_ 12EI

b. Ml. IIEI

c. ML SIY'

d. ML 7F.!

Dar» rOf Q. 36 & Q.37 are given below. Solve, the problems and cheese the correct answers.

A truss is showD -hi the figure. Members are of equal cross section A and same modul us of elasticity E, fl vertical force P 'is applied ar poinl C.

I'

C

34 Malch the following:

Llst-l

P SI9pe deflectior; method

36, Force ill dIe member AB 0f the truss is

a, ,'/../2

b 1'1../3

c. I'll
d. P

J7 Oeflecrion or the poim C ls

a. $\frac{(2J2+I)PL}{I \quad EA}$

b $\frac{.fiPL}{Ivl}$

e. (2..E+1)~

d (J2TI)~

38 A rectangular column section of25Qmni x 400mm Is reinforced will! 1lve sieet bars of grade Pe-S()O, each of 20l11m diameters, Concrete miN is M3Q, Al;ciul load on ~le col uum section ,vith miuimum eccentricity as per 1'8:45(;·2000 using linrit state-method ~'an be applied upio

a. 1107.37
b \80$,30
It 1806.40
d, 190J.7

39. A concrete beam 61' rectangular cross section of 200mm " 400mm is 'prestressed <vhh 11force 40ukN al eccentricity 100mm. l'he D;lllximunl compressive 'Stress in dIe concrete is

a. .I1.5'N/mm ¹
b. 7.5N!nuu'
c S.ON/nun'
II ~,5N/",m'

4() The flexural strength of M3(l concrete as per 1S:456·2000 IS

a.),S3 MPa
b 5,~7Ml'Q
c. 21,23 MPa
d J().O Ml'a

41 'In a random sampling procedure-for cube strengtb 0f concrete. one sample conslsts oi X number of .specimens, These' specimens are tested, at 28 days and average strength of these X specimens is considered as lest 'result of lIle sample, provided lhe individual variation in the strength of specimens is,not more than ± Y per cern of the average strength, The values uf X and V as per 1S:456·2000 are

a. 4 and 10 respectively
b, 3 and 10 respectively
G. 4 and 15 respectively
d. 3 and 15 respectively

Dllt" for Q.42 & Q.43' are given helew. Solve. the pro hiems lind choose correct nnswers,
Assume straight line instead of parabola for stress-strain curve of concrete as gi ven below and partial factor of safety as LO

Jl/J °1.
0.1102 '0.0035

Ihlrt

A rectangular under-reinforced concrete section Qr 3{l0010i Width and 50001111effective depth is reinforced witlt:1 bars of grade Fe"" 15, each of ICInundiameter Concrete mix IsM20,

42. The depth of lhe neutral -axis from the compression fibre is

~, 76nim
b. Slmm
c. 87mm
d. LOOnun

+3. The depth of the neutral axis obtained as per 15:4$6-2000 differs from fhc.deptTl of neutral axis obtained ill Q.12 by

a; ISmn
I), 10mm
c. 25mn!
d. 32mm

A~ An unsii ffened web t-seciion is l'libiic3ICd from a t0111" thtck plate by lill~f weldi ns as shown in the tlgure. If yield stress of steel is 250MPa, rhc maximum shear load that seotion-can lakeis

200mm

a. 7$OkN
h. 350 kN'
e. J37.5 kN
d ,00 kl'J

45. A tJllol-\ve]ded joint of (imlli size is shQlVO lll tile figure fbl!.., welded surfaces mee HI. 60-90 degree and permissible stress In the

mlet weld is 108 MFa_ The safe load thal ean be transmlued by tnejoim is

12.. f fL

s. 162,7 kN
ll, 151,6k'N
c. 113.4 "N
d. 1095kN

46. Whlch one of'the followi ng is NOT correct for steel sections as per lS , SO()..19841
a. The maximum bending stress in rensien or In compression in extreme fibre calculated on the effective section of a beam shall DOt exceed 0,66 l;..
b The bearing sires:! ill nuty pari of" n beam when calculated on the net area shall not exceed 0.75,«.
a. TIle direct stress in compression oo the gross sectional area: of axially loaded compression member shall not exceed 0,6 ~..
d. None of the.above.

47 A cantilever beam of 1et1.:,~lk width b 'and depth d is loaded with a concentrated vertical load at the tip. If yieldIng starts at a lo~d I'. the collapse. load shllll be
s. 2. 0'"
b. I ~ P
C. 1.2 P
d. P

48. tn s constant bead permeameter with cross section area of 10cm'~, when the flow was lak'ing-place under a hvdrllulic gradient of 0.5_(he amount of water collected in 611 seconds is 600cc. The pcnu~bililY of the 5011 is
ll 0,002 canis
b. 0,02 COlt;;
c. 0.2 *cmls*
d 2,0 *em/s*

49 Two observation wells penetrated into a confined aquifer .and located 1,5k}il apart in lite direction of Dow, i"dica.re head 0f 4~m and 20)11 If the coefficient of permeability of tho aquifec is 30m/day and porosity Is 0..25. the' limo of travel ofr .an inert tracer from onewelllo another is
a, ~16 7 days
b. 500 day-~
c. 7,0 day9
d, 3000 days

50, Assuming- that .. river bed level does not change and the depth of Ivater in river "las tOm, 1S 111 and S' ru duciug the months of feb",.ry, Juty and' December respectively of a particular ycnr, The average bulk denslty of the, soil rs 2()l>N/m~ The densi ty of water ɹ— l!jkN/ro~ The effccliv.c Stress or ll depth of 10m below the river bed durins these months would be
a, 300 *kN/ru'* iu February, ~50 kNlm' Julv and]201c,NlmliItDe~"rllbllr
b. 100 kN/nll in February. 100 kN/III~ July and 100 kN/m' in December
c. 200 *kJN/m'* tn February. 250 kNlm; JulY.!lJld 180 .kNlm^2 fn December
d, 300 ki'l/m^1 In February, 350 k'Nlm' July *aM* 280 kN/n? in December

5L For a triaxial shear test conducted on a. sand specimen at a confining pressure of 100 kN/m» under drained cQnditiOl.15. resulted ill a deviator sums (o1 - (l)) at, fa;lure ol:100kNlm~. Tbe angle of sheari ng reslsrance oflhe ~ollwould be
4 18.4.,"
b. 19.47"
c. 2656"
d. 10"

52, A am higjJ retaining wall is supporting a saturated send [saturated elllc to capillarY action) of bulk. density 18 kN/m^1 and angle of $I,eanJ1l! resislance.l0- TIle change ill magnitude of active earth pressure at the base due to rise in ground water table from the bose 0f the Jootlng to the ground surface.shall (r. = i0 kN/m^3)
a, increase by 20 *kN/m'*
b. decrease by 20 "N/",' c.
increase by 30 kNlm~
d. decrease by 30 kNllll?

53 For two infinite sIllPC> (one in 0'1 condition and other in submerged condition) in a sand deposit having the angle of shearing resistance *30-*, fa,Clor of safety was determined as 1 5 (for both slopes), The slope angles would have been
s. 21 05" for dry slope and 21 05" for submerged slope

b. *19Ar* Ibr UI) Sl6pO and 18"'10' ror submerged slope

... 18A IUI uJ) ~IUI"" und 21.0S tUI sut""~r~ed J<J!pc

d. 22,6 Ihr dry slope and L9.41' I\lr sull.ll"'l'god slope

/\ strip' tbot"!@. (8ru wide) is designed for n tullli soutemll,\I' of 40mlh. I I I e IIafc bearing cnrncity (shear] was 150kNlm~ and sn~c aUuwnble soil F""Slli1: IVA.' I0QkNll1L. Due li'l unportuuce ef the .1I1I<l[ore, now 1111fO'111111;1" I~ tie red~Signed for loInl Sdlll~"Illellllf25mOl. The new width Ul' U10 rooting will 110

a. Son

b. Sm

c. 12m

d. 12,8 m

55. Dilling, Ihe subsurface IDvest!SUII(II!S tor design 0l' toundations; o slandard penetrution lost WIIS conducted III -l.5m below the ground snrtucc. The record of number "fblows i~givel1 belew:

Ptutl,'Uilutl depth (cm)	Number "r~tu....
(1 7.5	3
7.5 15	3
15-22.5	IS
22.5 30	6
3\1-315	II
37.5-45	7

ASSuming rhe water table ut ground level. soll as tioe sand lind correction Iactor for overburden o~ 1.0. the cnrrected "N' vfilu-tor the scil would.be

a. IR

b. 10

c. 21

d. 33

56. A soil muss contnins 4Q% -SllIvel, 5\)% SIlnd and 11)% silt. This ~oil can be clllssific,d as

a. sillY sandy e.rovel having coetllcieut of uuiforunty Jess ibU1100,

b. "ilty gravelly saud having coefficient .)l' unil;'nnily "411011\\ H)

c. gravelly silty sand having C()cl1ii!lonl ofl1nilonnily greater thnn 60.

d. gravelly silty stlod and Its coefllcieut 01'unilormity CMIIOI be determined,

57 J\ saturated soil mass has II lolal dens;", 22k'!li/m~ and *n* WIll~re"ntu"t (ir 1c)%. The hulk density and dry den.it~ ofthis soil nre

a. 12 kN{m" & 20 kN.m} respectively

b. 22 kNlp.J & 20 kN,m} respectively

c. 19.8 kN/,"l &. 19.~ ltl'l/ml respectively

d. *23.2kN/m~* &. 19.&kN/m~ respectively

-58. A.~tNn", function i~given by:

'I' : 2.,' *y*+ tx+ I).,'

The 11.)10mte neross a Iine joining points-AC.I. 0) and D(O. 2'18

a. OAllnil~

b. ,,l unhs

c. 4 uti:L#

d. :5 units

59. The ci.,.,!lllribn °1" around a circle of "udill.s 1 holts lor Ih. velocity 'field u~2.,,-Jy and *v* --2)' is

a. · 6Jr units

b. - 12n units

c. -1811 uniu

d. -241<w1ilS

(\0. A 1l1n.kund 0 d-f\dc'()1 ur~ placed (r- 11 triction.less [rLliley The lank i""lI~s water Jet (mass density .0I' wut9r I()()Ol.glm». which strikes the d~I1""t'lr and 111m. I~ ~5<>.U' 1J,~velocity of jet Icaving the dellectnr IN "'ml~ Dud discharge i. O.j ".jis, lhe force recorded by the spring will be

a. tOON

b. 100 J2 "

c. 10() n

d. 200 J'iN

61. Cross-section- of an objecl ('hnv'ng same 8OOlil)lI IIQrmul 111 rhe ptlf,>'I' submerged into u Iluid OQII~Is1soro .'<luolU\f ~idl)S,2m :Llfd triangle IIs .shown In the JiS"" (l,. III!jeolI5' hinged 01 poi III I' that is one meter below tho fluid Jill" surface. If the Obj~L ill-

__ k~plin

file .posillou

ns ~h'T\~I In

the fis.~.

the Ynh~ or

-x' should

be

a. -,5
b. 4,[3
c. 4m
d. 8In

62 CriliQal depUI al d ~""liO'l of a ~<ltJllleu1ltr ehnnne] i~1.5m, The specific energy 01 lh"l aeerion is
n, 0.75111
b. 1.Om
c 1.5111
d. Wm

113. A partially open sluice gal': discharges, wa er into n rectangular "honn~11110 tail water depth in the chaMel i. 3m and Froude number is /12' If ~ free hydraulio JIl11TPs III be fumecl'llt dewnsireem oJ'the sluice gate alter the venn ermtract of the Jd conutlg OUI "OIn U,e sluice- yaw. uie sluice gale ~penin!l sbould be (lXlcllioit.'Ut of conti ac boll Co - u.9),
n. 1)301
b. 0.401
c. 0.6901
d, 0.901

('\4. A lrinngular irrigntion lined C11nal carrie .. a <iis<UlMgc "f2S01Jj~ "l bed slope 1/6000 II' tile side slopes of lfie canal aN] : 1 and Nfunning"s coefficient is 0.0]8. the cenlml depth of'Oow i~equal to
a. ~1)8m
b. 3.6201
c. 4.91m
d. 1,a1m

65. II' iomQto juice i~having n pH of ~. I. [he hydrogen ion concentration "ill he
a. 10.94· 10" mollL
b. 9,94 Ill" mol11.
c. 8.94 x 10 'moliL
d, 7..94 1(1'" mo til.

66. l.lsl-1 conrains some j1fUpertic. of Wal~T/Wasl" water and Li~I-n: "<mtAins lisl of some lcijls 00 wated w ... te water. Match Lisl-1 wilh L.il!l-Unod select the correct ,mswer using Ill~ codes given below the lists:

Lisl-l
P. Su.'p(;nd"d SOlid. concentration
Q. M<:t!lboli"'llrbiode8rnda~lc organics
R. Bacterial cenceairation
S. Coagulanl dese

Lis[-II
1. BOO
2. MPN
3. Jar test
4. "UJ11idity

Codes:

	P	Q	R	S
a.		1		3
b.	4	1	2	3
c.	2	4	1	3
d.	.1	2	1	3

67. Msrch List-l wilh LiM-[J 8"d select the oorrect answer u~inS the codes gi"" below the lists ;

List-I
P. Thiokenm!'. "f slud&e by ahem;",' oxidation
Q. St~bil.iz.ti(lllllf sludg" o. chemical tn:.InJCnl
R. c"udifionillg of'aludge
S. Redu"lion 0[5111d80 f)()'UIlion Of SI·.vily

List-II
1. Decrease. in volume of
2. Scpanllion of WltlT by hellt
3. DigcMion or sludge
4. Sep.rntiop of water by

	P	Q	R	S
a.	4	3	1	2
b.	.3	2	4	
c.	..	.'	.2	
d.	2	1	3	4

6~. A circa l•• primM'y clarili er processeS on avon,se flow or 5005111 ^{3}/d ,'l' municipal waste lVater. Th... overflow I'I'I~ i. 35m^{3}tm^2/d.The- diameter of ol~ri(1er sbnll be
a. lO.Sln
b. Il.5m
c. 125m
d. 1,'.5,"

6<) Maldl List-I with Lrst-Il and ..,IGOt tlto correct answer using the codes gillen below the lisL~:

Lisl-l

I'. Release valve

Q, Check valve

it Galę valve

S. PilOt vdl"~

Ltsl-JJ

1. Reduce high inlet pressure to lower outlet pressure
2. L,uuIl the il"w uf water In ~{tI!llo direcuon
J. Remove air hom the pipeline
~. Starring lhę 11tllV of Willer ill the pipet inc.

Codes :

	I'	Q	I~	S
a,	J	2	~	I
b.	.I	2	I	.3
c.	3	4	.2	I
II	I	'1	4	3

70 10 u certain siuatlon waste water t1iS<lhQ--edinto u river mixes willi Ule river wAler Justantuneously nnd completely. Fulluwing is the d1J1lavailable:

Waste water [.)0 - 2.()O msll

Discharge rule= 1.10 01¹/s

River woter DO = 8.Jmgtl Ph)w

ru~ ~.70m)/s

Tempcrarnrc - '20"C

Iwtlli.! HUUH(L of DO in 111' mixture of waste and ri ver shall be

a. 5.3mgll

b. (l.5lllg/l

c. 7.611lgil

d. &.4111gd

Data for Q,71 & Q.72 ne'e !til'en 1"'10,,.. Soh. the probl.l1LSand choosecorrect answers.

I\ city is going t" insttll tho rapid sand lifter .1lor the sedimentation tanks.

Usc illc lollllving data,

Deliigl1lC1ndint'role 10the filter - 2O()".1(m~d

Design lluw role - 0.5 m)/~

Surface area per liher box 50m~

71 Tho surface urea required for the rapid sand filler will be

a. 110n1²

b. 115m~

c. 11liml

d. 218m²

72. The number of'tilrers required shall be

a. _I

b. 4

y. li

d. 8

73. The ouhumble commanded urea lor • distri "UIJ" IS 2 ' 10³ In¹ The 'itll'~llsi!v (lf irrigation lOr U crup is 40· •. It' J(ur \~"1Or depth and kor period lllr the crop rue L40m and " weeks, respectively, the Þeak demand discharge.is

3, 2.6:"nl s

b. '1.6'3 m'/s

c. 8,5~m'ls

d. lUS mJ·s

"14. Uplift I'tCS--llrdll points E and D (figure A) of n strnight hOri7,0n111 floor of IICIJligi~l~ lhickitess with ,i ~hel>1 IiiL: HI d()wnsl"QIII end ure ZM~ nud 20~". respectively If !l,e sheet plle rs al upslr.lam end of the tloor (fig II""· 11). the uplifi' P.,".SII"" nl pdi nts 1)1 and Ct ore

~~ o1 ir'-

....

u. dR% "llld 6()0:" t.!,~poctiv"I)'

b. 80" "nd72~" respectlvety

c. 8~. and "10% respectively

d. I(10"~and zero respectively

75 A luuuthing "prun is to he deslgued al downstream U' u weir rot discharse int<losh)' of 65 III¹/.ym. For the design 0f [aunching "pron" the scour deplb is tnken two limes of Lace} scour deprh, The sill factor of the bed mol.rial. IS unity. If the loll water depth is 4.4m. the leogth 0.l' launchlng apron ill ihe launched position Is

u. J5-m

b. 'h7 m

c. 5m

d. 5.[5111

Data (O! Q:7G & Q.77 are given below, Sol". ,h. prublems and choose correct answers,

J\ four hour unit hydrograph of a catchment ,l~ triangular in shape ""Ih base of SO hours. The ,ℓℓ, ofthe c.(dllnent ,i~?2tlkm". 111d base Flow and ~ indClt Arc 30m-'i. Md I mml1~resl_livel)'. A 6101111,)(.4 em oc:cun; uniformlY In 4hours over lhe .:':.tchmtnL

76. l'he peak discharge of four hour unil hytlJ'OgJ'lIplls

n. 4() roll"
b. 50 tn"s
c. 60 m-lls
d. 70 mJ/~

77. The peek fiQC)dd;';uharjle due W Ih~ ,Inrm i~

a. 210m}fs
h. *230m!15*
e. 2(oOm³/s
II. '72OlII'"S

78. P.)l' ~ .25cm ~,ick cement concrete pavement, ~11~lysi. of stresses gives U,. followi"!! values:

Wheel load stress due to comer loading " .. ,....... 30l;g/l!m'

WhC<l1 Imld strC$$ due III cld!!" l03din~ , 3 2\:.g(cllI'

Wnr.ping stress al comer region dur.lng_ sujnuner ~4._"",.., •.9kgJcm~

W.rping stress .1 comer region durlng winter 7kWQJJ1~

",f.rplog stress .1 edge l-egion during. summer 8k.gferu:

·W.rpin.S slreSS .1 edge region duritlS winl"r 6k.g.cnl'

-Frictional stress' dUliltg summer ,..,......... 5kglcm"

Fricj;I)I1,1 ~ltess during winter .... .4kglcm~

The O'O~1 ~ritiC'.l $Ire:;~ value rOt tbJ~ pOVomiJI1 is

n. 4Ukg/cm!
b. 42kglcm'
c, 41lks/cm'
d. 45k1!/cm'

79. l'he Yol1l1willgobservations were made o(lin ~~()-Illad survey '10 • l'1)nd:

~tlp load' (~	Repctiti<)11S pc... dDy
3S43	8(lO
75-85	~O(1

TIle itandard axle-load j& 80kN. P.quivalenl daily numbers ofrepetltl'otls fer II." standard axle-load ore

D. 451)
b. 4&1
c. 800
d. 1200

SO. A trlUCiport company' operates • schedubid dolly lI'l1l0; service between city I~and city Q. One-way Journey tltn~ between lhesol two cities lil 85. hours. A minimum layover tim" cd' 5 bo"n; is to be provided ·.t each city, How mony trucks are required 10 provide IIlis."rvi~c~

'l. +
b. I)
e. 1
d. 8

8]. A single. llUIeunidir""lionol blghway hilS. d•• ign speed of u;kmph. The perception-brake-reaction lime. of drivers i< 2.5 seconds ~ud the IIVCDII.0 lengLb of vehicles **is SUL** The coefficient **of longitudinal** fiction of (he paVern":" **i.** (I.1I.. '!'he capacity of ntis 'road in terms IlF "Vehic.tes pc..hour p.:r lane' is

D. l440
b. 750
C. 710
d. 6~)

82. A l'0;,,1i~having " horizonlal curve of 41K'm mdiu. 1111 \\'~icb o 'Supc:r.. eJe"~tiQn l.f ()(17 is provid~d. The coef'li.cienl 0f lal~~al .lli~tion mobilized on the curve-wl1en ",'chicle is travelllng a; 100 kmph is

a. I),OJ
b. O.1~
c. ().IS
d. 11.4-

S~. rlln~lder the: system (lf equntions' *Av*, .•, "O"U = %,,0' .where, ,. IS ~. sealer, tel *0.:1,)* be an eigen-pair or an eigen value **and ils** couespouding **oig.,;n** vector for real In.lrlx A. Let I be • (n nl ruul matrix, Which one of the following statement i~ 1'101' Conlact 7

•. For. homogeneous n n Ilystem of lineal' equations. (A-)j)x = ()havin,g • noutrivial 5010(;011. Lbo rank of IA-"J) Is less than n.

b. Fat malrix A"" m being o posinve integer, (l·1^m•X t"'l will be the eigen-p"ir I~r~U

c. II AT = A-I. then |A| = I lor all i.

ll> ff AT =A. then i.l is (e.1 for all i.

84-. Tnmslorm.li"n to linear form h~ .11bStillting v ~ yHt ul'tbeequ.liou

tty
iil pill>' q(t) y': n > 0

will be

ll. tl, / dt ı (1- nlpv =(1- -)q

b. dv / dl I (J-II)pv-(1~II)<1

.,_dl + (I~It)Jlv= (1-11)11

ll. dll / —ı +(1"- n)pv= (I+n)4

~5. A fail engine accelerates Irom it. ~tatio"nr'y I>osllion tbr & seconds .ud tl'lIveh ~ distance of 280m. Ac.cordill.!! 10 d,e Mean Value TIlcONm. (he speedometer .ft a certain' lime during acceleration m'nsl read exactly

a. 0 kmlJL

b. 8 km

c. 7S.km!h

d. 126 kmlh

86. The ,,'1)1utiol) of dl), <l-l 12 dl' / dx 17)"',0' ..\{O'−L dY(X) / dx 4 =0

iu the nu~c 0 X "!!_4 is 'y/,"I' by

a, e. (c'O~4.,,!sin,1...)

b. .' (cos4.\' ~.in ·l·x)

ю. .,' (C,,~."'-±Nin.~)

d. e.....(cos~ ... ~ltin4:t')

87. Value of the iDtegral ∮(.tf<J.v - ı tlT). ,

'I here, c is the sqU3l'e cut from the fiJ'st (Jlladranl hy the linesx - l and y = I wlJJ be, (Use Green's theorem to change the line inlcgrlrl into double ii.tegr.l)

a, 1/2

b. 1

c, 3/2

d. 5/3

88. Consider 1ike1yapplicability (If Duchy'. lntegrol Theorem 10evaluate the following i:niegroJ counterclockwise around the unit circle c. I= 0l see :uz •

z being • c.oiupic.- variable, 111,0value of I will 00

•. f 0.! singularities gel ~

b. I -. 0 ~[flsul4ril[e!! SOL .

I.: 2 1~'ɲm =0.1. i . . . }. . . .

c. I - ni2 : singularities s~t (:tlllr;" =0.J.2 ....",.)

d. none or.bove

n.t.ll fnr Q.1I9 & Q.90 Ute ginn ""I uw. S"rv~ lh~ l.rllbl.Ols 3n\f r.hlltlS~ cnneci answer, GIve" ., G. we Wl,,, tn calculare its reciprocal value]1a by tlS.ilg Newton Raphson Metl\Qd for t{~)={).

8ll. The Newlun Ral'hsnn olgorid.m for the function will be

~. X,L"=-2l(/KC>.1 "'t I

b. .T_ · =(.< "2"t ;

c. ·!7-., = 1,~,,a :~/

d. ~01= 'I-Z^xJ I'

90. Fur з = 7 and starting. wilh :<o = ().2. the fir.t two iterations will be

a. 0~11_0.J299

b. Q.U 0.1.392

c. 0.12, O.JA 16

d. 0.13,0..1428